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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/603,684	06/26/2003	Mahmoud H. Abd Elhamid	GP-302186	3780
65798 7590 09/26/2007 MILLER IP GROUP, PLC GENERAL MOTORS CORPORATION 42690 WOODWARD AVENUE SUITE 200 BLOOMFIELD HILLS, MI 48304			EXAMINER CANTELMO, GREGG	
			ART UNIT 1745	PAPER NUMBER
			MAIL DATE 09/26/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/603,684

Applicant(s)

ABD ELHAMID ET AL.

Examiner

Gregg Cantelmo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4, 7-22, 25-33, 48 and 49 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7-22, 25-33, 48 and 49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. In response to the amendment received July 19, 2007:
 - a. Claims 1-4, 7-22, 25-33 and 48-49 are pending;
 - b. The 112 rejection stands regarding the term "substantially" and regarding the indefinite nature of the dependent claims pertaining to the expanded graphite;
 - c. The prior art rejections are withdrawn.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1-4, 7-22, 25-33 and 48-49 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The term "substantial" in claims 1-4, 7-22, 25-33 and 48-49 is a relative term which renders the claims indefinite. The term "substantial" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is unclear as to what amounts of the claimed particle size of the graphite/conductive material having an original particle size greater than the thickness of the plate constitutes a "substantial portion". The original disclosure fails to use or describe portions which clearly define the term "substantial" thus the term itself is vague and indefinite.

Furthermore by reciting the term "substantial portion" for the graphite/conductive material the claims now include two types of graphite/conductive material. That which constitutes the claimed "substantial portion" and the remainder which is not within the claimed "substantial portion". Thus all of the claims directed to further defining "said graphite" or "said conductive material" is unclear as to whether it is directed to the "substantial" portion, remaining "insubstantial" portion or both.

Response to Arguments

3. Applicant's arguments filed July 19, 2007 have been fully considered but they are not persuasive.

Applicant rebuts the indefinite rejection by asserting that the language of the claims would have been readily understood by one of ordinary skill in the art and relies on MPEP 2173.01(b) to support their position. However this argument fails to provide clear evidence to support the assertion that such a term would have clearly been understood by one of ordinary skill in the art since there is no evidence particular to the fact patterns of this case to support this assertion nor is there any clear showing that this term, used in this manner, is in fact understood by an unbiased ordinary worker in the art. Furthermore the arguments therein do not remedy the deficiencies in the claims set forth above. For example, the term "substantial" is not a clear and absolute term in the art and what one person in the art would consider to be "substantial" is not necessarily constant throughout the art. Thus the term is held to be relative and indefinite.

Further Applicants argument does not remedy the deficiencies in the claim language regarding the dependent claims and whether the limitations therein apply to the "substantial portion" and/or "insubstantial portion" since it fails to provide clear evidence to support their assertion. Again such evidence may not be held to overcome the indefinite nature of the claims. For example, claim 1 appears to define a "substantial portion" and an "insubstantial portion" of the expanded graphite. Each dependent claim which recites "said expanded graphite" is indefinite since it does not clearly define whether the limitations therein are directed to the entire amount of expanded graphite or to one of the substantial portion or insubstantial portion. Furthermore such arguments are not persuasive when at least some claims appear to be directed to only one of the Applicant is advised to amend the claims to indicate whether the limitations of the dependent claims are directed to the substantial portion, insubstantial portion of both. Applicant is advised to amend the dependent claims to clearly indicate that the limitations there are directed to all of the expanded graphite of the independent claims to overcome this rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 4, 7-10, 18, 21, 22, 25, 26, 48 and 49 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,882,570 (Hayward) as

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evidenced by "Particle Size Conversion Chart" from Sigma-Aldrich Internet site (http://www.sigmaaldrich.com/Area_of_Interest/Research_Essentials/Chemicals/Key_Resources/Technical_Library/Particle_Size_Conversion.html).

Hayward discloses of a composite plate having opposing surfaces wherein the plate includes a polymeric binder and an expanded graphite material and wherein the expanded graphite includes particles which prior to compression at least a portion of the expanded graphite particles will have had a particle size which was greater than the final thickness of the plate. Notably the initially expanded graphite particles have a particle size in the range of 35-80 mesh (500 micrometers to 177 micrometers as evidenced by the Sigma Aldrich particle size conversion chart). Thus the initial particles range from 177-500 micrometers (col. 2, ll. 50-57). These initial particles are then expanded at a ratio of 8-10 times their original size (col. 3, ll. 4-9). Thus the final expanded particles which are 8 times the original size range from ~1.4-4 mm and for 10 times their original size, range from ~1.77 to 5 mm. Thus the final expanded graphite particles are anywhere from ~1.4 to 5 mm in size, on average. The particles are then compressed and molded to the desired shape (col. 3, ll. 30-32). By example the mixture is molded to a thickness of 0.125" or 3.175 mm. Thus at least a "substantial portion" of the expanded graphite particles above will be of a size (on average of upwards of 4-5 mm) which is greater than the final thickness of the plate (3.175 mm). Thus the composite plate of Hayward will have the same structure (as applied to claims 1, 18 and 21).

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The expanded graphite particles, for an expansion ratio of 8 renders graphite particles which range in size from ~1.4-4 mm (discussed above as applied to claims 4 and 22).

The polymer is a thermoset polymer (col. 1, ll. 58-60 as applied to claims 7 and 25) and can be an epoxy resin (col. 4, ll. 31-35 as applied to claims 8 and 26).

The expanded graphite is compressible (col. 3, ll. 30-32 as applied to claim 9).

The expanded graphite formed by Hayward expectedly inherently results in a porous material (as applied to claim 10).

Based on the final plate thickness exemplified 3.175 mm and the upper limits of the expanded graphite 4-5mm. These upper average particle sizes are held to be greater than 10% of the final plate thickness (as applied to claims 48 and 49).

Claim Rejections - 35 USC § 102/103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 13, 16, 17, 29, 32 and 33 rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Hayward.

With respect to the properties of claims 13, 16, 17, 29, 32 and 33: Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. In re Rijckaert, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990).

In the case of the instant application the basis for expectation of inherency is that since Hayward teaches of using the same expanded graphite having the same size in a thermoset resin the combination which is used as a bipolar separator conductive sheet, there is a reasonable expectation that composite separators of Hayward would inherently exhibit the same claimed permeation and specific resistance requirements, absent clear evidence to the contrary (as applied to claims 13, 16, 17, 29, 32 and 33).

The Examiner requires applicant to provide that that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency' under 35 U.S.C. 102, on prima facie obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same...[footnote omitted]," The burden of proof is similar to that required with respect to product-by-process claims. In re Fitzgerald, 619 F.2d 67, 70, 205 USPQ 594,596 (CCPA 1980) (quoting In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433-34 (CCPA 1977)).

Claim Rejections - 35 USC § 103

6. Claims 2, 3, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayward as applied to claims 1 and 18 above, and further in view of CA '894, of record.

The teachings of claims 1 and 18 have been discussed above and are incorporated herein.

The differences between claims 2-3 and 19-20 and Hayward are that Hayward does not teach of providing the expanded graphite in an amount between about 10-50% volume (claims 2 and 19) or between about 20-35% by volume (claims 3 and 20).

Hayward teaches of using about 45-60 wt% of expanded graphite relative to the amount of resin (col. 3, ll. 40-44). Varying the amount of carbon to resin ratio either in terms of wt% of vol% would have been obvious to one of ordinary skill in the art so as to obtain separator plates having sufficient degrees of electrical conductivity, mechanical strength and fluid impermeability.

CA '894 teaches of a wide range of mixing ratios between the electric conductor and resin (page 25, ll. 3-9) and any of these ratios, including the preferred ratios are suitable amounts for generating a separator plate.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hayward to include ratios above and below those ratios claimed since they would have provided an acceptable ratio of conductive material to resin in the separator plate and provided the predictable result of a separator having sufficient electrical conductivity and reactant impermeability. Generally, differences in ranges will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such ranges is critical. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969). It has been held that when the difference between a claimed invention and the prior art is the range or value of a particular variable, then a prima

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facie rejection is properly established when the difference in the range or value is minor.

Titanium Metals Corp. of Am. v. Banner, 778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985).

7. Claims 11, 12, 27 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayward as applied to claims 1 and 18 above, and further in view of CA '894.

The teachings of claims 1 and 18 have been discussed above and are incorporated herein.

The differences between claims 11, 12, 27 and 28 and Hayward are that Hayward does not teach of providing a filler (claims 11 and 27) wherein the filler is one of glass fibers, metal fibers, cotton flock, PAN-based carbon fibers and mesh (claims 12 and 28).

CA '894 discloses that it is known to add various fillers to a separator including glass fibers so that the mechanical properties of the separator can be improved (paragraph bridging pages 32 and 32).

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hayward by adding a fibrous filler to the composite mixture since it would have improved the mechanical properties of the separator. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945) See also In re Leshin, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

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8. Claims 14, 15, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayward as applied to claims 1 and 18 above, and further in view of either JP '679 or JP '465, of record.

The teachings of claims 1 and 18 have been discussed above and are incorporated herein.

The differences between claims 14, 15, 30 and 31 and Hayward are that Hayward does not teach of providing a conductive coating (claims 14 and 30) wherein the coating is one of gold, silver, platinum, carbon, palladium, rhodium and ruthenium (claims 15 and 31).

According to JP '679: A fuel cell has an electrolyte film, positive electrode and a negative electrode 20 in both sides of the film, collector 30 in the outside of the electrode 20 and a collector terminal 40 brought into contact with this collector as a single cell. Here, a surface of the collector 3 consisting of porous carbon sintered material or the like is coated with a metal of platinum, gold, iridium, etc., excellent in conductivity and corrosion resistance to about 0.05 to 2 μ m by a sputtering method or the like. In this way, a sum of contact resistances between the collector 30 and the terminal 40 and between the collector and an electrode and resistance of the collector 30 itself is reduced to about 1/2. Since a metal is advanced into an interface of the collector and a catalytic layer, also hydrogen adsorbing power is improved.

JP '465 teaches providing an expanded graphite outer layer to a carbon based separator. Expanded graphite is a particular carbon product (abstract).

The motivation for providing a metal film on the outer surface of the composite separator is to reduce the contact resistance of the components.

Therefore it would have been obvious to one of ordinary skill in the art at the time the claimed invention was made to modify the teachings of Hayward by providing a metal film on the outer surface of the composite separator since it would have reduced the contact resistance of the separator. The selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

Response to Arguments

9. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gregg Cantelmo whose telephone number is 571-272-1283. The examiner can normally be reached on Monday to Thursday, 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Pat Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Gregg Cantelmo
Primary Examiner
Art Unit 1745

gc
September 20, 2007